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A-5:91-79(S) (CRD/CNWBD)

December 16, 1991

DEPARTMENT OF ENERGY DECLASSIFICATION REVIEW

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AUTHORITY:  DDC  DOD

NAME: John H. Hart

2<sup>ND</sup> REVIEW-DATE: 4/20/92

DETERMINATION (CIRCLE NUMBER(S))

CLASSIFICATION RETAINED

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CONTAINS NO DECLASSIFIED INFO

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CLASSIFIED INFO BROKETED

OTHER (SPECIFY): Does Not Contain UCN

# Potential NSNF Weapons Concepts for the 21st Century (U)

## Perspectives, Warhead Technologies, and Delivery System Concepts

Briefing to Joint Defense Policy Board/Defense Science Board Task Force on  
Non-Strategic Nuclear Forces

December 17-18, 1991

- 1A - William Daitch, DNA
- 2A - J. S. Howard, A-5, MS F602
- 3A - T. P. Seitz, NWT-WP, MS F633
- 4A - CRM-4, MS A150
- 5A - A-5 File

~~CRITICAL NUCLEAR WEAPON  
DESIGN INFORMATION - DOD  
DIRECTIVE 5210.2 APPLIES~~

DDO-D1755  
Doc 17442

*Sandia*

DERIVATIVE CLASSIFIER

J. S. Howard

Name

Staff Member, A-5

Title & Organization

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*Los Alamos*

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## NSNF Briefing Overview

A-5:91-79(6) (SRD/ENWDI)-

December 16, 1991

### ***Perspectives-***

- Commitments to NATO
- Future 3d World Nuclear-Armed Adversaries
- Instability & Spillovers from Soviet Union Dissolution
- Deterrence & Insurance over Far-Term of 50+ Years

### ***Warhead Technologies-***

- Safety Enhancements
- Flexible and Modular Designs:
  - Fieldable Prototypes
- Low Yield Designs

### ***Delivery System Concepts -***

- Stealthy Stand Off Bomb
- Tactical Earth Penetrating Weapon
- Convertible Torpedo
- ASRAM
- Air-Launched Precision Strike Weapon

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## Perspectives on NSNF - I

### **WHY: *Forward-Deployed Commitments to NATO***

- Preclude Proliferation via Extended Deterrence Guarantees and Programs of Cooperation
- Ensure Deterrence as Weapons of Last Resort
- Promote Stability with US Presence in Post-Cold War Europe

### **HOW:**

**100s of Air-Delivered Systems in Europe**

### **TECHNOLOGIES:**

**B61 Stockpile Improvement Programs**  
**New Delivery Concepts**

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## Perspectives on NSNF - II

### **WHY: *Deterrence of Future 3d World Nuclear States***

- Provide Credible Regional Deterrence with Appropriate Options
- Preclude Sanctuary to Nuclear-Armed Leadership
- Protect Deployed US Forces

### **HOW:**

**CONUS Contingency Force of Low Yield Systems**

### **TECHNOLOGIES:**

- Very Low Yield Earth Penetrator Weapon**
- Low Yield Anti-Theater Ballistic Missile**
- Low Yield Air-Delivered Stand-off Missile**

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## Perspectives on NSNF - III

### **WHY: *Insurance to Counter Post-USSR NSNF***

- Counter Russian Civil War Spillovers and Loss of Central Nuclear Control
- Deter Resurgent Russian Imperialism Armed with Nuclear Weapons

### **HOW:**

**Air-Delivered Weapons in Europe**

**CONUS Air- & Sea-Launched Forces**

### **TECHNOLOGIES**

**Common Strategic & Non-Strategic  
Stand-off Air Munition**  
**Maritime Bomb & ASW Options**

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## Perspectives on NSNF - IV

### **WHY: *Stability, Insurance, Deterrence over the Far Term***

- Proliferation Control through Extended Non-Strategic Deterrence
- Balance "Pre-Strategic", "Sub-Strategic", and Tactical Weapons Possessed by Other Industrial Nations
- Guard against Technological Surprise in Unpredictable Future

### **HOW:**

- Limited Builds and Prototyping
- Maintenance of Core Competence

TECHNOLOGIES  
Supersafe Designs  
Advanced Designs & Materials

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*Perspectives:*

**The President's Initiatives will Change the Deterrent,  
Challenge the Complex, and Demand a New Role  
and Impact from RD&T**

---

- Stand-down of many alert forces
- Environmentally sound, low-cost destruction of many weapons, with few new builds
- Dramatic reductions in deployed US and Soviet weapons, plus increased concern for weapons and SNM in post-USSR and other countries
- Deterrence, role of nuclear weapons will evolve
  - Some current weapons will be adequate for the near-term, others will not, BUT

*Nuclear Deterrence Remains a Cornerstone of  
National Security Policy*

**Nuclear Warhead Technologies will Remain an Important  
Component of Evolving National Strategies**

7

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*Warhead Technologies: Safety / Flexible & Modular Designs: Fieldable Prototypes*

**Enhanced Surety in a Graded Approach:  
a Guiding Principle will be  
Stockpile Stability for 50+ Years**

**We Will Emphasize:**

- A "Common Pit" for the B61 and W80 families providing IHE, fire resistance, pit reuse, and other features such as laser initiation
- Small Builds and Fieldable Prototypes
- Supersafe primary designs, e.g., a Pu-free primary for the ALCM/ACM, B61
- A new IHE (LAX-112) with energy density nearly equal to conventional high explosive
- Predictive capability for nuclear safety in abnormal environments

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***Warhead Technologies: Safety / Flexible & Modular Designs: Fieldable Prototypes***

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*Warhead Technologies: Safety / Flexible & Modular Designs: Fieldable Prototypes*

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*Warhead Technologies: Safety / Flexible & Modular Designs: Fieldable Prototypes*

**MULTIPLE-APPLICATION SURETY TECHNOLOGY (MAST)  
EXAMPLE: CONVERSION OF W91 TECHNOLOGY FOR MULTIUSE**

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**\* Goal: Sandia, Los Alamos, and the production agencies develop and prototype a warhead system and modern primary with enhanced surety features and ES&H compliant safing, arming and firing technologies for future SIPs and warhead development programs**

- B61-3/4/10
- Stand-off Bomb
- Dual Capable Bomb
- Tactical Air-to-Surface Missile
- Minuteman III Missile
- HPRF

**\* Major Tasks**

- Integrate System Requirements
- UGT Demonstration
- Establish Environmental Capability
- Produce Functional Proof-of-Concept Hardware
- Establish Production Processes

11

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*Warhead Technologies: Safety / Flexible & Modular Designs: Fieldable Prototypes*

**MULTIPLE-APPLICATION SURETY TECHNOLOGY (MAST)**  
**APPLICATIONS**

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*Warhead Technologies: Safety / Flexible & Modular Designs: Fieldable Prototypes*

**MULTIPLE-APPLICATION SURETY TECHNOLOGY (MAST)  
FEATURES**

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*Warhead Technologies: Safety / Flexible & Modular Designs: Fieldable Prototypes*

## **Deterrence by Capability: Fieldable Prototypes and Small Builds – A new concept for consideration**

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### **Why?**

- **Flexible response in a changing world**
  - Future builds will not be as large as before
  - Broader military requirements
- **DoD thinking provides the technological imperative**
  - How to maintain the defense industrial base
  - Change the culture from "big program" = success
  - R&D has big role in "deterrence by capability" and in reconstitution
- **Linkage with future of DOE infrastructure**
  - Smaller, more flexible complex
  - Small builds and fieldable prototypes help maintain capability between larger production runs

14

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*Warhead Technologies: Safety / Flexible & Modular Designs: Fieldable Prototypes*

## **Pu-Free Design Concept -- A Supersafe Initiative (U)**

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December 16, 1991

***Warhead Technologies: Low Yield Designs***

**Very-Low-Yield Nuclear Weapons could be very effective and credible counters against future third world nuclear threats**

- **10-ton EPW**
  - Hold buried C3 at risk
  - Neutralize MOBs by cratering runways
  - Collateral damage very localized
- **100-ton ATBM warhead**
  - Destroy nuclear, biological, or chemical warheads in flight
- **1000-ton battlefield weapon**
  - Deter use of mass destruction weapons by third world nations
  - Destroy company-sized units in overrun scenarios

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December 16, 1991

*Warhead Technologies: Low Yield Designs*

## **W86 PERSHING II EARTH PENETRATOR**

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*Warhead Technologies: Low Yield Designs*

A-5:91-79(8)-(SRB/CNWDI)-

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## **W33 AFAP Modified into a Tactical Low Yield Earth Penetrating Weapon**

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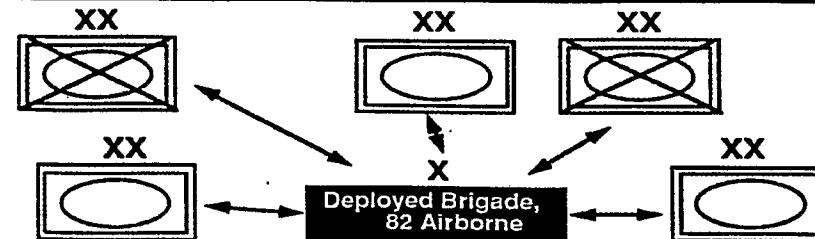
December 16, 1991

*Warhead Technologies: Low-Yield Designs*

**A Low Yield Air-Launched Weapon Could Provide  
Capability to Prevent Overrun of Our Early Entry Forces**

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December 16, 1991

## **Hundreds of NSNFs Should Be Maintained and Modernized Within New US National Strategies**

**As the US Downsizes its Military and Nuclear Warhead Stockpiles, a Nuclear Force Other Than Strategic Weapons Is Needed –**

- For NATO forward-deployment**
- To deter future nuclear-armed third world adversaries**
- To guard against Russian instabilities, and post-USSR relapses and regional spillovers**
- For far-term deterrence & insurance**

**The Nuclear Weapons Laboratories Must Maintain a Broad Level of Competence to Support Future NSNF Needs**

20

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# Laboratory/DOE Briefing on December 17, 1991, to Joint DPB/DSB Task Force on Non-Strategic Nuclear Forces

## Attending Members of Task Force

GEN John W. Vessey, USA, Ret (Former CJCS)

Dr. Joseph V. Braddock (BDM Intl)

GEN Andrew J. Goodpaster, USA, Ret (Former USAREUR CDR)

ADM Huntington Hardisty, USN, Ret

Dr. Charles A. McDonald

GEN Donn Starry, USA, Ret

Ambassador Seymour Weiss

Other Task Force Members: Dr Harold Agnew, Prof Graham Allison, GEN James Dalton USAF Ret, GEN Russel Dougherty USAF Ret, Dr Albert Narath, Dr James Roche

## Government Task Force Representatives

Dr. Robert Barker (OATSD-AE)

Dr. Everett Beckner (DOE)

Mr. William Kahn (OSD/TNF)

MGEN Gerald G. Watson (CDR DNA)

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DOE OFFICE OF Classification

*R. Shandell, DD* DATE: 1/2/09

23 pp.

**PURPOSE:** To brief DOE Laboratories Warhead & Delivery System Technologies for Task Force consideration and use to Secretary Cheney. Expanded to include Perspectives on NSNF Roles.

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NUCLEAR INFORMATION

## **Laboratories Personnel at Briefing**

**Los Alamos:** Tom Seitz, Frank Smith, Joe Howard

**Sandia Albuquerque:** Jack Werth, John Anderson

**Lawrence Livermore:** Kent Johnson

**DOE Headquarters:** Ev Beckner

**Two Hour Briefing:**

**1. Los Alamos:** Introduction, NSNF Roles, Nuclear Warhead Technologies (Common Pit, Multiple-Application Surety Technology, Fieldable Prototypes, Supersafe Designs, Low Yield Designs-- EPW, Battlefield Deterrence)

**2. Livermore:** NSNF Nuclear Warhead Applications & Effects (EMP, TBMD, Low Yield EPW)

**3. Sandia:** NSNF Delivery System Concepts (Stealthy Stand-off Bomb, Tactical EPW, Convertible Torpedo, ASRAM, Air-Launched Precision Strike Weapon), Summary

**4. DOE:** Future Production Complex

## Back-Channel Responses

### December 17 Laboratories Briefing:

- Excellent, Superb
- Viewgraphs wanted by Task Force

### December 19 Task Force with SecDef Cheney:

- Unusual two-hour session, very well-received
- Used Laboratory VGs
- SecDef remains committed to an NSNF capability
- Task Force to prepare report and remain as body for further work

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# Potential NSNF Weapons Concepts for the 21st Century (U)

## Perspectives, Warhead Technologies, and Delivery System Concepts

Briefing to Joint Defense Policy Board/Defense Science Board Task Force on  
Non-Strategic Nuclear Forces

December 17-18, 1991

UNCLASSIFIED & SANITIZED VIEWGRAPHS FROM  
SECRET-RESTRICTED DATA-CNWDI BRIEFING

*Sandia*

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*Los Alamos*

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### ***Perspectives-***

- Commitments to NATO
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- Instability & Spillovers from Soviet Union Dissolution
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### ***Warhead Technologies-***

- Safety Enhancements
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Fieldable Prototypes
- Low Yield Designs

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## Perspectives on NSNF - I

### **WHY: *Forward-Deployed Commitments to NATO***

- Preclude Proliferation via Extended Deterrence Guarantees and Programs of Cooperation
- Ensure Deterrence as Weapons of Last Resort
- Promote Stability with US Presence in Post-Cold War Europe

### **HOW:**

**100s of Air-Delivered Systems in Europe**

### **TECHNOLOGIES:**

**B61 Stockpile Improvement Programs  
New Delivery Concepts**

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## Perspectives on NSNF - II

### **WHY: *Deterrence of Future 3d World Nuclear States***

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### **TECHNOLOGIES:**

- Very Low Yield Earth Penetrator Weapon**
- Low Yield Anti-Theater Ballistic Missile**
- Low Yield Air-Delivered Stand-off Missile**

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### **WHY: *Insurance to Counter Post-USSR NSNF***

- Counter Russian Civil War Spillovers and Loss of Central Nuclear Control
- Deter Resurgent Russian Imperialism Armed with Nuclear Weapons

### **HOW:**

Air-Delivered Weapons in Europe

CONUS Air- & Sea-Launched Forces

### **TECHNOLOGIES**

Common Strategic & Non-Strategic  
Stand-off Air Munition

Maritime Bomb & ASW Options

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## Perspectives on NSNF - IV

### **WHY: *Stability, Insurance, Deterrence over the Far Term***

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- Balance "Pre-Strategic", "Sub-Strategic", and Tactical Weapons Possessed by Other Industrial Nations
- Guard against Technological Surprise in Unpredictable Future

### **HOW:**

- Limited Builds and Prototyping
- Maintenance of Core Competence

**TECHNOLOGIES**  
**Supersafe Designs**  
**Advanced Designs & Materials**

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*Perspectives:*

## **The President's Initiatives will Change the Deterrent, Challenge the Complex, and Demand a New Role and Impact from RD&T**

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- Stand-down of many alert forces
- Environmentally sound, low-cost destruction of many weapons, with few new builds
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- Deterrence, role of nuclear weapons will evolve
  - Some current weapons will be adequate for the near-term, others will not, BUT

*Nuclear Deterrence Remains a Cornerstone of  
National Security Policy*

**Nuclear Warhead Technologies will Remain an Important  
Component of Evolving National Strategies**

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*Warhead Technologies: Safety / Flexible & Modular Designs: Fieldable Prototypes*

## **Enhanced Surety in a Graded Approach: a Guiding Principle will be Stockpile Stability for 50+ Years**

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### **We Will Emphasize:**

- A "Common Pit" for the B61 and W80 families providing IHE, fire resistance, pit reuse, and other features such as laser initiation
- Small Builds and Fieldable Prototypes
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  - Predictive capability for nuclear safety in abnormal environments

Does NOT contain Uncontrolled Confidence  
Nuclear Information

Reviewed  
by  
Date

David W. Lanz, LANL CO 4/6/09  
T-1000 (1000)

*Warhead Technologies: Safety / Flexible & Modular Designs: Fieldable Prototypes*

## **STRATEGIC PIT RECOVERY**

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*Warhead Technologies: Safety / Flexible & Modular Designs: Fieldable Prototypes*

## **PIT REUSE**

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*Warhead Technologies: Safety / Flexible & Modular Designs: Fieldable Prototypes*

**MULTIPLE-APPLICATION SURETY TECHNOLOGY (MAST)**  
**EXAMPLE: CONVERSION OF W91 TECHNOLOGY FOR MULTIUSE**

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\* **Major Tasks**

- Integrate System Requirements
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- Establish Environmental Capability
- Produce Functional Proof-of-Concept Hardware
- Establish Production Processes

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*Warhead Technologies: Safety / Flexible & Modular Designs: Fieldable Prototypes*

## **MULTIPLE-APPLICATION SURETY TECHNOLOGY (MAST) APPLICATIONS**

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*Warhead Technologies: Safety / Flexible & Modular Designs: Fieldable Prototypes*

**MULTIPLE-APPLICATION SURETY TECHNOLOGY (MAST)  
FEATURES**

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*Warhead Technologies: Safety / Flexible & Modular Designs: Fieldable Prototypes*

## **Deterrence by Capability: Fieldable Prototypes and Small Builds – A new concept for consideration**

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### **Why?**

- **Flexible response in a changing world**
  - Future builds will not be as large as before
  - Broader military requirements
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  - How to maintain the defense industrial base
  - Change the culture from "big program" = success
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## **Pu-Free Design Concept -- A Supersafe Initiative (U)**

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*Warhead Technologies: Low Yield Designs*

**Very-Low-Yield Nuclear Weapons could be very effective and credible counters against future third world nuclear threats**

- 10-ton EPW
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  - Deter use of mass destruction weapons by third world nations
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*Warhead Technologies: Low Yield Designs*

## **W86 PERSHING II EARTH PENETRATOR**

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*Warhead Technologies: Low Yield Designs*

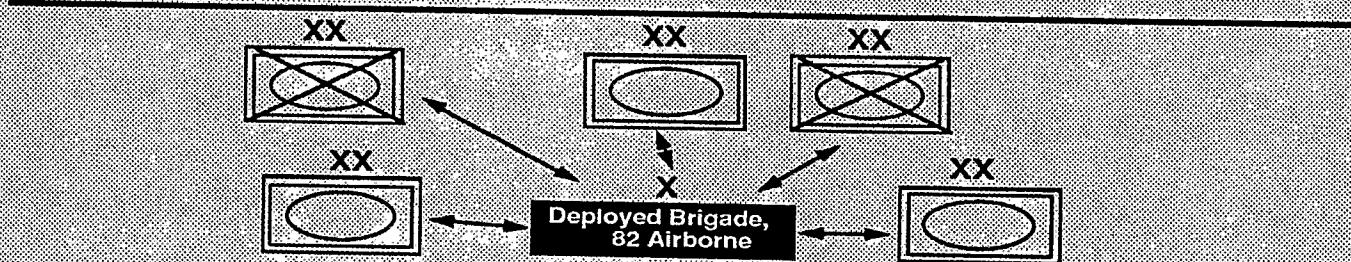
## **Tactical Low Yield Earth Penetrating Weapon**

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*Warhead Technologies: Low-Yield Designs*

## A Low Yield Air-Launched Weapon Could Provide Capability to Prevent Overrun of Our Early Entry Forces

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**The Nuclear Weapons Laboratories Must Maintain a Broad Level of Competence to Support Future NSNF Needs**

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